

Mobile User Objective System (MUOS)

Executive Summary

- The Navy successfully launched the first Mobile User Objective System (MUOS) satellite (MUOS-1) in February 2012, and conducted contractor and government developmental testing on the MUOS-1 legacy communications capability and primary and alternate control stations.
- The Navy's Commander, Operational Test and Evaluation Force (COTF) conducted a Multi-Service Operational Test and Evaluation (MOT&E) from August 15 – 29, 2012. Integrated developmental testing and preliminary analysis of operational testing indicate the MUOS-1 satellite is capable of providing legacy Ultra-High Frequency (UHF) communications to mobile users and the Navy is able to command and control the satellite over the MUOS primary and back-up telemetry, tracking, and commanding systems.
- Continuing challenges integrating the secure MUOS waveform onto the Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) terminals may cause cost increases and schedule delays.

System

- MUOS is a satellite-based communications network designed to provide worldwide, narrowband, beyond line-of-sight, point-to-point, and netted communication services to multi-Service organizations of fixed and mobile terminal users. The Navy designed MUOS to provide 10 times the throughput capacity of the current narrowband satellite communications. The Navy intends for MUOS to provide increased levels of system availability over the current constellation of UHF follow-on satellites, as well as improved availability for small, disadvantaged terminals.
- MUOS consists of six segments:
 - The space transport segment consists of four operational satellites and one on-orbit spare. Each satellite hosts two payloads: a legacy communications payload that mimics the capabilities of a single UHF follow-on satellite, and a MUOS communications payload.
 - The Ground Transport Segment is designed to manage MUOS communication services and allocation of radio resources.
 - The Network Management Segment is designed to manage MUOS ground resources and allow for government controlled precedence-based communication planning.



- The Ground Infrastructure Segment is designed to provide transport of both communications and command and control traffic between MUOS facilities and other communication facilities.
- The Satellite Control Segment consists of MUOS Telemetry, Tracking, and Commanding facilities at the Naval Satellite Operations Center Headquarters and Detachment Delta.
- The User Entry Segment provides a MUOS waveform hosted on MUOS-compatible terminals. The JTRS is responsible for developing and fielding MUOS-compatible terminals.

Mission

Combatant Commanders and U.S. military forces deployed worldwide will use the integrated MUOS satellite communications system to accomplish globally assigned operational and joint force component missions with increased operational space-based narrowband, beyond line-of-sight throughput, point-to-point, and netted communications services.

Major Contractor

- Lockheed Martin Space Systems – Sunnyvale, California
- General Dynamics C4 Systems – Scottsdale, Arizona

Activity

- The Navy successfully launched the MUOS-1 satellite on February 24, 2012. The contractor conducted orbital operations and contractor testing and transferred the MUOS-1 satellite to the government Program Office on June 21, 2012.
- The Navy conducted a government Technical Evaluation on the MUOS-1 and the Satellite Control Segment July 2 through August 1, 2012, in preparation for operational testing.

NAVY PROGRAMS

- COTF conducted MOT&E-1 on the satellite control capability and MUOS-1 legacy communications capability from August 15 – 29, 2012, in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan.
- The Navy completed MUOS- 2 satellite thermal vacuum testing and is preparing to ship the satellite in November 2012 for an anticipated launch in July 2013. The Navy plans to ship satellites #3, #4, and #5 in FY13, FY14, and FY15, respectively.
- The Navy operators have completed training and are commanding the MUOS-1 satellite at the Naval Satellite Operations Center in Point Mugu, California.
- The ground transport site preparation at Wahiawa, Hawaii; Geraldton, Australia; and Northwest, Virginia, is on schedule.
- The Navy's JTRS Network Enterprise Domain program is working to resolve integration problems associated with porting the secure MUOS waveform on the JTRS HMS Manpack radio.
- The MUOS program developed an end-to-end developmental test strategy incorporating additional testing prior to the MUOS MOT&E-2 and JTRS HMS FOT&E to discover and correct any integration problems prior to operational testing.
- The Navy plans to conduct the MUOS MOT&E-2 in the FY14 timeframe to operationally test the full MUOS capability.

Assessment

- Although analysis of the operational test data is ongoing, integrated developmental testing and preliminary analysis of operational testing suggest the MUOS-1 satellite is capable of providing legacy UHF communications to mobile users and

- the Navy is able to command and control the satellite over the MUOS primary and back-up systems.
- Challenges integrating the secure MUOS waveform onto the JTRS HMS terminals may cause cost increases and schedule delays to both programs. If the MUOS and JTRS program managers cannot resolve latency and reliability issues due to terminal processing constraints, the MUOS MOT&E-2 may be delayed.
 - COTF cannot adequately test the MUOS capacity requirements in MOT&E-2 due to an insufficient number of JTRS-equipped mobile users. COTF will need to supplement MOT&E-2 data with validated modeling and simulation or other data to evaluate the system's ability to operate at its planned capacity and link availability levels.
 - The MUOS Performance Model that will be used to model MUOS capacity is behind schedule and needs improvements to be accredited in time for MOT&E-2.

Recommendations

- Status of Previous Recommendations. The Navy adequately addressed two of the three previous recommendations. The remaining recommendation to operationally load the system for MOT&E-2 is no longer valid.
- FY12 Recommendation.
 1. The Navy should ensure adequate resources and expertise are applied to the MUOS Performance Model to make this a viable simulation to assess MUOS capacity requirements.